CLAIMS

1. A crystalline polymer exhibiting reversible crystal transition phenomenon in the solid phase state at a crystal transition temperature (Ttr) of 0°C to 67°C (67°C > Ttr > 0°C) and satisfying the relationship defined by the following formula (1):

$$150 > \Delta Htr > 1.6Ttr - 3.5 \quad (1)$$

wherein ΔHtr represents an endotherm (J/g) accompanying crystal transition and Ttr represents the crystal transition temperature (°C).

2. A crystalline polymer exhibiting reversible crystal transition phenomenon in the solid phase state at a crystal transition temperature (Ttr) of 0°C to 67°C (67°C > Ttr > 0°C), having a weight average molecular weight of 600,000 or less, and satisfying the relationship defined by the following formula (2):

$$150 > \Delta Htr > 1.6Ttr - 15 \quad (2)$$

3. The crystalline polymer according to claim 1 or claim 2, which is a copolymer of butadiene and an olefin.

4. The crystalline polymer according to any one of claims 1 to 3, wherein the polymer is a modified polybutadiene.

5. The crystalline polymer according to any one of claims 1 to 4, wherein the raw polymer of the modified polymer contains 97 mo% or more trans-1,4-structure.

6. The crystalline polymer according to any one of claims 1 to 3, wherein the polymer has a melting point (Tm) of 100°C or more.

7. A thermoresponsive board comprising a flexible substrate and a layer of a material exhibiting reversible crystal transition accompanied by volume change provided on one of the surfaces of the substrate.

8. The thermoresponsive board according to claim 7, wherein the material exhibiting reversible crystal transition accompanied by a volume change is is trans-1,4-polybutadiene with a trans-1,4-bond content of 90% or more.

9. The thermoresponsive board according to claim 7, wherein the material exhibiting reversible crystal transition accompanied by a volume change is the crystalline polymer any one of claims 1 to 6.

10. The thermoresponsive board according to claim 8, wherein the material exhibiting reversible crystal transition accompanied by a volume change is prepared by forming a film of trans-1,4-polybutadiene by applying a homogeneous solution of the trans-1,4-polybutadiene to one side of a substrate.

11. The thermoresponsive board according to claim 9, wherein the material exhibiting reversible crystal transition accompanied by a volume change is prepared by forming a film of the crystalline polymer according to any one of claims 1 to 6 by applying a homogeneous solution of the crystalline polymer to one side of a substrate.

12. The thermoresponsive board according to any one of claims 7, 8, and 10, wherein the surface of the substrate has a porous structure.

13. An overheat-protection element comprising the thermoresponsive board according to any one of claims 7 to 12.

14. A thermoresponsive switch comprising a pair of electrodes, and an insulating component made of the crystalline polymer exhibiting crystal transition in the solid phase state and a component made of a conductive substance provided between the pair of electrodes, the electric connection and disconnection between the pair of electrodes being caused by change of volume expansion rate of the crystalline polymer when the polymer exhibits transition in the solid phase state near the crystal transition temperature range.

15. The thermoresponsive switch according to claim 14, wherein the crystalline polymer is the polymer according to any one of claims 1 to 6.

16. The thermoresponsive switch according to claim 14, wherein the conductive substance is a metal.

17. A thermal storage material and a thermal storage medium comprising the crystalline polymer according to any one of claims 1 to 6.

18. A method for heating the thermal storage material and thermal storage medium according to claim 17, characterized by using a microwave.